New Taxa and Revisions to the Taxonomy of Southern African *Lapeirousia* Subgenus *Lapeirousia* (Iridaceae subfamily Ixioideae)

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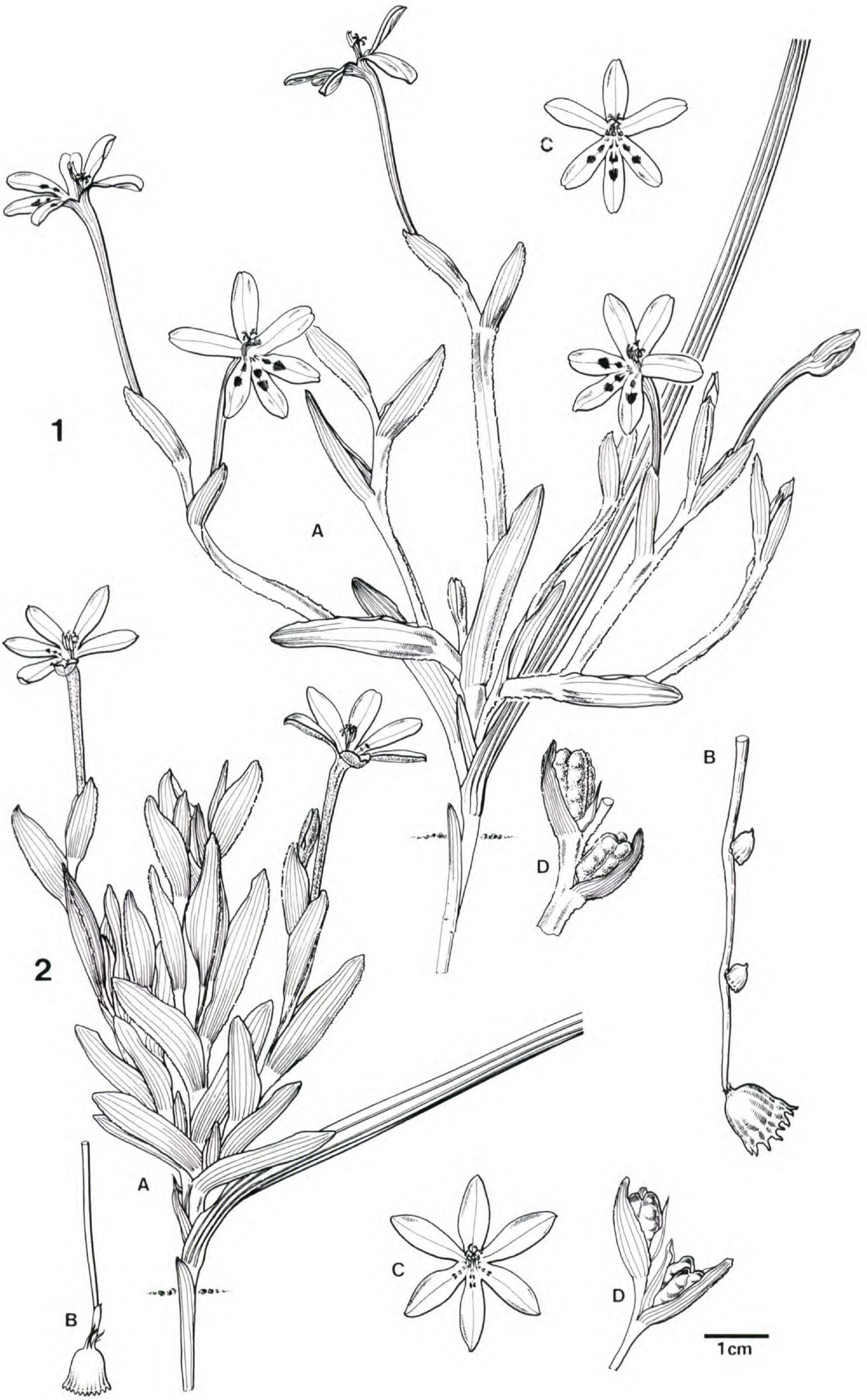
ABSTRACT. Studies of the pollination biology of the southern African species of *Lapeirousia* subg. *Lapeirousia* have indicated the need for several taxonomic changes in the alliance. *Lapeirousia simulans* is a new species, until now confused with *L. arenicola*, a fairly widespread species of the Cape west coast: *L. simulans* occurs sympatrically with *L. arenicola*, but subtle differences in flower patterning, capsule and seed morphology, and bract size separate the two. New evidence indicates that varieties *spinosa* and *tenuis* of *L. divaricata* should both be treated as separate species, and they are recognized here as *L. spinosa* and *L. tenuis*. The former is an allopatric vicariant of *L. divaricata*, differing in its compact growth form and larger flowers. *Lapeirousia tenuis*, however, appears to be more closely related to *L. dolomitica*, from which it differs in flower size, tepal color, and length of the perianth tube. Examination of living plants matching the type of *L. macrospatha* indicates that the species was incorrectly treated as conspecific with *L. barklyi*. The two differ consistently in flower color and markings, the length of the perianth tube, and the shape of the floral bracts, and are most likely not immediately related. Lastly, populations of the widespread *L. pyramidalis* with a dark blue, purple, or red perianth, a longer perianth tube, and odorless flowers are segregated here as subspecies *regalis*. Subspecies *regalis* is most likely adapted to a different pollinator than subspecies *pyramidalis*, which has a pale blue, pink, or white perianth, a shorter perianth tube, and a strong floral odor.

The tropical and southern African genus *Lapeirousia* Pourret comprises some 40 species currently segregated in two subgenera (Goldblatt & Manning, 1990, 1992). Subgenus *Lapeirousia*, with 21 species, is centered in the coastal and near interior parts of southwestern Africa but includes two tropical African species (Goldblatt, 1990). Subgenus *Paniculata* Goldblatt & Manning, with 19 species, comprises the largely tropical African section *Paniculata* (14 species), with one species in the southwestern part of southern Africa, and section *Fastigiata* Goldblatt (5 species), restricted to the southwestern Cape region of South Africa (Goldblatt & Manning, 1992). Field studies of the pollination biology of subgenus *Lapeirousia*, conducted over the past two years, have yielded new information about the genus and indicated the need for substantial taxonomic revision.

Sixteen southern African species were included in subgenus *Lapeirousia* by Goldblatt (1972), who then treated it as section *Lapeirousia*. One cryptic species, included in *L. arenicola* Schlechter, is now understood to be a distinct species, here described as *L. simulans*. *Lapeirousia divaricata* N. E. Brown, treated by Goldblatt (1972) as comprising three varieties, is now reconstituted. Variety *spinosa* Goldblatt, raised to species rank as *L. spinosa*, differs consistently from *L. divaricata* in its ecology and morphology and merits separate species status. Variety *tenuis* Goldblatt, now *L. tenuis*, appears to be more closely related to *L. dolomitica* Dinter than to *L. divaricata*. It has broadly conic corms with spiny margins identical to those of *L. dolomitica* and can be distinguished from this species largely by its short-tubed flower with narrow tepals and non-inflated floral bracts.

In the widespread *Lapeirousia pyramidalis* (Lamarck) Goldblatt, patterns of floral variation suggest the need for the recognition of two subspecies. Typical subspecies *pyramidalis* has strongly scented white, pale blue, or pale pink flowers with a perianth tube of intermediate length. What we recognize here as subspecies *regalis* is restricted to the northwestern Cape and has darkly pigmented, red, purple, or violet flowers with a long perianth tube and no scent. Lastly, it is now apparent that *L. barklyi* Baker and *L. macrospatha* Baker were incorrectly united by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Goldblatt (1972). On the basis of floral morphology *L. macrospatha* appears to be most closely related to *L. arenicola* and shares with it hypocrateriform, cream-colored flowers with reddish markings and long floral bracts. *Lapeirousia barklyi*, however, has lilac to purple flowers with shorter perianth tubes, and shorter floral bracts. It appears to be most closely allied to *L. fabricii*. Both the latter have apomorphic flowers with the tepals cupped at the base and large, ridged, toothlike calluses on the lower tepals.

The addition of three new species, and the recognition of one more raised from synonymy, brings the total species in subgenus *Lapeirousia* to 21. All the additional species are restricted to the west coast and near interior of the Cape Province, South Africa, a region known as Namaqualand. This area of semi-arid climate and low, but almost exclusively winter rainfall is evidently an even more important center of speciation for the subgenus than was apparent in the past. Fifteen of the 21 species of the subgenus occur here, and 10 of these are either widespread or narrow endemics of the area.

1. Lapeirousia simulans Goldblatt & Manning, sp. nov. TYPE: South Africa. Cape: Knersvlakte, 10 km N of Vanrhynsdorp, 14 Sep. 1992, *Goldblatt & Manning 9454* (holotype, NBG; isotypes, K, MO, PRE, WAG). Figure 1.

Plantae 10–18 cm altae, cormo infra leviter dentato, campanulato 7–8 mm diametro, spicis (2–)3–5 florum, floribus albescentibus tepalis inferioribus rubris notatis, tubo perianthii ca. 30 mm longis cylindricis, tepalis inaequalibus superioribus tribus majoribus, dorsalis ca. 11 × 4 mm, inferioribus 10 × 3–3.3 mm, filamentis 5–6 mm longis, antheris 2–2.5 mm longis contiguis, stylo infra bases antherarum diviso, ramis styli ca. 2 mm longis divisis ad dimidium, capsulibus 8–10 mm longis verrucosis.

Plants 10–18 cm high. *Corm* campanulate, 7–8 mm diam., 6–9 mm below ground, the tunics dark brown, glossy, the base lightly serrate, the teeth directed downward. *Leaves* 3 or more, the lowermost longest, usually about twice as long as the stem, linear, 2–4.5 mm wide, ribbed (corrugate), remaining leaves progressively shorter above, becoming ± bractlike and usually subtending a branch. *Stem* compressed and 2-angled, the angles irregularly minutely serrate, 2–3(–5)-branched (rarely simple), the branching divaricate, below ground bearing a cormlet at each of the two subterranean nodes. *Inflorescence*(*s*) lax spikes of (2–)3–5 flowers; *outer bracts* green, transparent on the veins, keeled, the keels decurrent on the stem angles, lightly serrate, 10–18 mm long; *inner bracts* about half as long as the outer. *Flowers* zygomorphic, whitish, reddish brown on the reverse, the lower 3 tepals each with a small filiform tooth near the base, and with a small basal and larger median dark red spot, unscented; *perianth tube* cylindric, 27–30(–33) mm long, slightly wider and curved near the apex; *tepals* unequal, the upper 3 slightly larger than the lower, when fully open all held ± horizontally, and at right angles to the tube, ca. 11 × 4 mm, the lower 3 held closely together, 10 × 3–3.3 mm. *Filaments* unilateral, erect, 5–6 mm long, exserted ca. 3 mm from the tube; *anthers* 2–2.5 mm long, purple, the pollen purple. *Ovary* oblong, ca. 3 mm long; *style* erect, held adaxial to the stamens, dividing between the mouth of the tube and the bases of the anthers, the branches ca. 2 mm long, divided for slightly more than half their length. *Capsules* oblong, 8–10 mm long, lightly verrucate in the upper half, without auriculate apices or locular ridges; *seeds* globose, yellow-brown, ca. 16 mm diam., regularly colliculate (the cells fairly small).

Flowering early to late September, occasionally in late August.

While searching for the insect pollinators of *Lapeirousia arenicola*, a fairly common species of sandy soils in the Knersvlakte north of Vanrhynsdorp, we noted that tall plants with a more open branching system and shorter bracts than normal for the species also had corms particularly deeply buried in the sand. These plants consistently had a large cormlet at each of two subterranean nodes of the stem (Fig. 1B). Plants corresponding to our interpretation of *L. arenicola*, co-occurring with the taller, cormlet-bearing individuals, are compact, have larger bracts, and shallowly buried corms, and the underground part of the stem always lacks cormlets (Fig. 2B). Flowers of the two plants are virtually identical in their shape, color, and markings, and differ only slightly in size (Figs. 1, 2). Additionally, typical *L. arenicola* seems to begin flowering earlier in the

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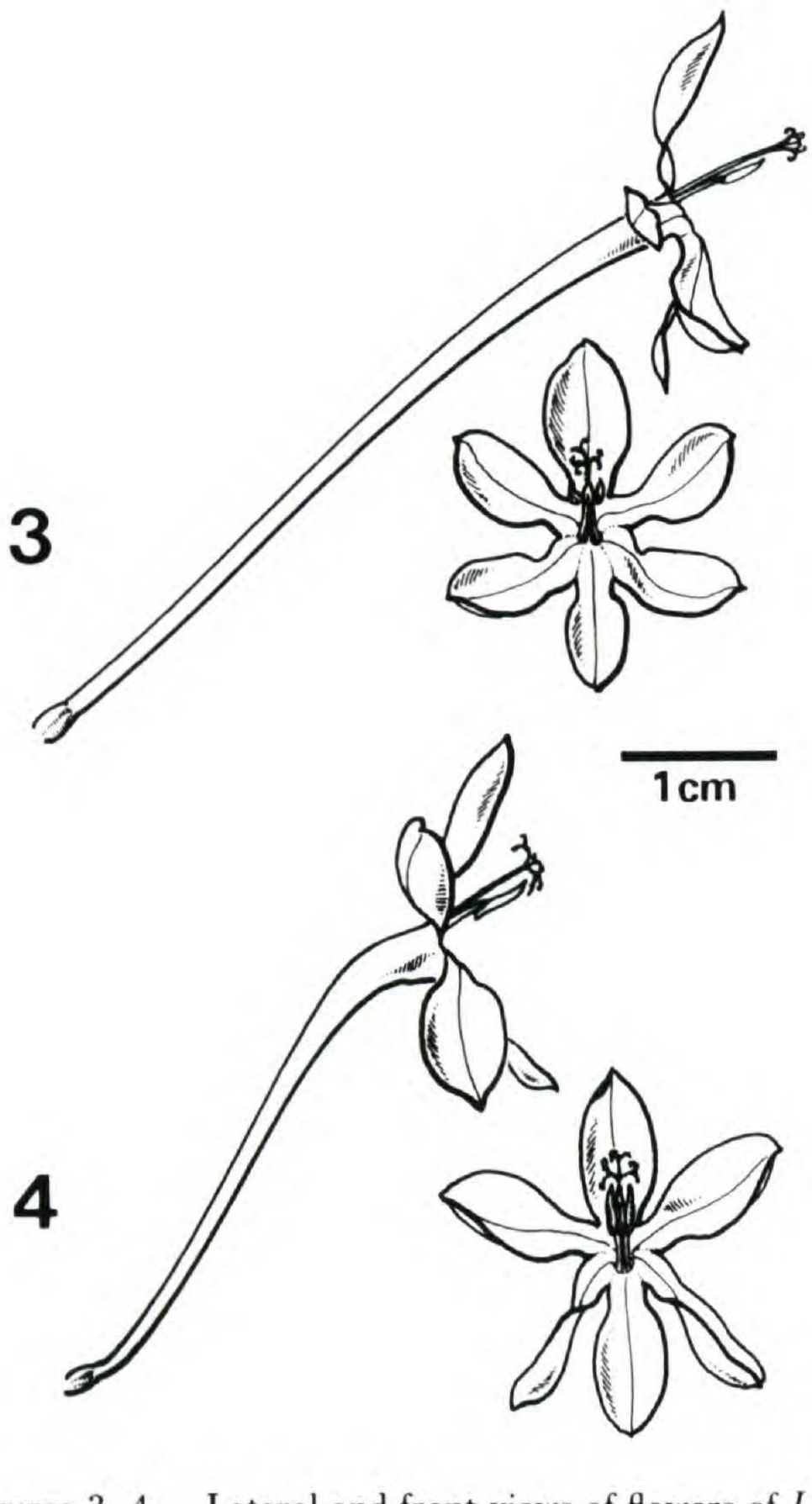
Figures 1, 2. 1. *Lapeirousia simulans* Goldblatt & Manning. —A. Whole plant. —B. Corm and underground part of the stem, showing a cormlet at each underground stem node. —C. Front view of flower. —D. Mature capsules. 2. *Lapeirousia arenicola* Schlechter. —A. Whole plant. —B. Corm and underground part of the stem (without cormlets). —C. Front view of flower. —D. Mature capsules. (Drawn by J. C. Manning.)



Figures 3, 4. Lateral and front views of flowers of *Lapeirousia pyramidalis* subsp. *regalis* Goldblatt & Manning (3) and subspecies *pyramidalis* (4).

season. By the time the taller, less compact plants come into bloom, the flowers of *L. arenicola* have shorter tubes and shorter styles and are less brightly colored than earlier in the season.

We conclude that the taller, less compact, and later-flowering plants represent a second species, until now confused with *Lapeirousia arenicola*. Examination of available herbarium specimens reveals a few collections of what we here describe as *L. simulans*, all identified as *L. arenicola*, from the same general area north of Vanrhynsdorp, and from near Vredendal to the west. *Lapeirousia arenicola* has a wider range and extends through the coastal hills and coastal plain of Namaqualand to the edge of the Richtersveld, near Anenous Pass. Subsequently, we found that the capsules and seeds of the two species also differ. The capsules of *L. arenicola* are oblong, (8–)10–12 × 6 mm, and the apices have auriculate lobes decurrent on raised ridges on the upper half of the locules (Fig. 2D). The seeds are ca. 1.4 mm in diameter and have epidermal cells of the usual size for subgenus *Lapeirousia*. The capsules of *L. simulans* (Fig. 2D) are usually smaller, 8–10 mm long; are verrucate in the upper half; lack auricular apical lobes or locular ridges; and the seeds, ca. 1.6 mm in diameter, have unusually small epidermal cells.

Because *Lapeirousia arenicola* and *L. simulans* are so similar in their flowers, we have considered the possibility that they are merely morphs of a single species, one adapted to early flowering and with a more compact habit and shallower corms, and the other to late flowering and with a less compact habit and deeply seated corms. Such intraspecific and sympatric dimorphism is unknown in Iridaceae and seems to us unlikely here, especially in view of the differences between the capsules and seeds.

Paratypes. SOUTH AFRICA. **Cape:** 3018 (Vanrhynsdorp) 3 km N of Vredendal, sandveld, 16 Sep. 1970 (DA), *Hall 3818* (NBG); Vanrhynsdorp, 2 Sep. 1951, *Martin 825* (MO, NBG); 1.5 km NW of Vredendal (Cohen's farm), 8 Sep. 1970, *van der Merwe 151* (BOL, STE); ca. 10 km N of Vanrhynsdorp, 20 Aug. 1993, *Goldblatt & Manning 9609* (MO, NBG), 10 Sep. 1993 (fr), *Goldblatt & Manning 9701* (MO, NBG).

2. Lapeirousia pyramidalis subspecies **regalis** Goldblatt & Manning, subsp. nov. TYPE: South Africa. Cape: Middelplaas, ca. 5 km from farm Bidouw on the Wuppertal road, 8 July 1941, *Leipoldt 3866* (holotype, BOL; isotype, NBG). Figure 3.

Plantae similes subspecie *pyramidali* sed floribus rubris, purpureis, violaceis, vel atrocaeruleis, inodoratis, tubo perianthii (36–)40–50(–55) mm longo cylindraceo, tepalis subaequalibus, 10–12 mm longis, capsulis oblongis, seminibus tuberculatis.

Plants resembling the typical subspecies vegetatively and in the inflorescence and floral bracts. *Flowers* red, purple, violet, or navy blue, the lower tepals with cream markings on the claws and darker blue or red markings in the middle of the limbs, unscented; *perianth tube* (36–)40–50(–55) mm long, cylindric and straight throughout; *tepals* subequal, 10–12 mm long, the dorsal held somewhat apart from the others when fully open. *Stamens* and *style* as in subspecies *pyramidalis*. *Capsules* oblong-trigonous, the locules with prominent ridges, 7–9 mm long; *seeds* globose, smooth in profile, 10–12 mm diam., the epidermal cells in straight files, the outer periclinal walls domed and lightly tuberculate.

Flowering late July to early September.

Lapeirousia pyramidalis, one of the more widespread species of subgenus *Lapeirousia*, extends

from the southern edge of Namaqualand through dry areas of the northwestern Cape, to the Little Karoo and southern Cape (Goldblatt, 1972). Over much of its range it has a fairly consistent facies. Plants are compact and have broadly obtuse floral bracts. The flowers are pale blue or pale pink to lilac and have a perianth tube (16–)25–35 mm long, slightly curved and wider in the upper 5–7 mm (Fig. 4), and always strongly scented, both during the day and in the evening. In the west of its range, in the Olifants and Bidouw River valleys, and also at Karoopoort, to the south, plants corresponding to *L. pyramidalis* in general form, including the broadly obtuse floral bracts, have bright red, purple, or dark violet flowers, with a long, nearly straight perianth tube, 36–55 mm long (Fig. 3), and no discernible odor. The floral differences strongly indicate a shift in pollination strategy (Goldblatt et al., in prep.).

The two forms are too similar to be recognized as separate species but are sufficiently distinct morphologically to merit taxonomic recognition as subspecies. We propose to name the plants with darkly pigmented and long-tubed, unscented flowers subspecies *regalis*. As far as we know, the two subspecies are geographically separate and favor different habitats (and presumably are pollinated by different insects). Subspecies *pyramidalis* normally grows on shale and clay soils, but subspecies *regalis* has only been recorded on sandstone-derived stony sand.

A second variant of *Lapeirousia pyramidalis* occurs in the Knersvlakte in southern Namaqualand. This is the plant, *L. angustifolia*, named by Rudolf Schlechter in 1896. Regarded by Goldblatt (1972) as conspecific with *L. pyramidalis*, largely on the basis of shared apomorphic bracts with broadly obtuse apices, it also has an unusually short perianth tube for *L. pyramidalis*, some 16 mm long, and the white flowers have a light scent, rather different from that in typical subspecies *pyramidalis*. Flowers of typical *L. pyramidalis* subsp. *pyramidalis* are occasionally white, but more often pale blue or pale pink to lilac, are always strongly scented, and have perianth tubes usually 25–35 mm long. In addition, the seeds of *L. angustifolia* are apparently lightly rugulose and the cell surfaces are colliculate. This is different from the smooth seeds of *L. pyramidalis*, entirely without primary sculpturing, and with tuberculate cell surfaces (Goldblatt & Manning, in prep.). It is, however, difficult to separate *L. angustifolia* from *L. pyramidalis* in the herbarium, and the two appear to intergrade. Provisionally, we are adopting the working hypothesis that plants matching *L. angustifolia* are depauperate *L. pyramidalis*, in which seasonal conditions are such that the typical characters of the species are not always fully developed (tube length, strong scent, seed sculpturing, etc.). Although differences in seed morphology seem to be important in *Lapeirousia* (Goldblatt & Manning, in prep.), we conclude that *L. angustifolia* should continue to be regarded as a local variant of *L. pyramidalis*. Populations in the Knersvlakte need to be compared in poor and particularly good seasons to determine year to year variation in critical taxonomic characters.

Paratypes. SOUTH AFRICA. **Cape:** 3118 (Vanrhynsdorp) Olifants River Barrage (DD), 22 July 1941, *Esterhuysen 5377* (NBG). 3318 (Clanwilliam) ca. 15 km (9 mi.) N of Clanwilliam (BB), 22 Aug. 1950, *Barker 6420* (NBG); between Nardouwskloof and Bulshoek, 12 Aug. 1976, *Goldblatt 3837* (MO); near Clanwilliam, Aug. 1945, *L. Bolus s.n.* (BOL 23183). 3219 (Wuppertal) top of Bidouw valley between Blinkvlei and the Doorn River (AB), 23 July 1961, *Lewis 5824* (NBG). 3319 (Worcester) Karoopoort (BA), 30 July 1950, *Hall 282* (NBG); Karoopoort, 26 Aug. 1935, *Compton 5409* (BOL, NBG).

3. Lapeirousia spinosa (Goldblatt) Goldblatt & Manning, comb. et stat. nov. Basionym: *Lapeirousia divaricata* var. *spinosa* Goldblatt, Contrib. Bolus Herb. 4: 66. 1972. TYPE: South Africa. Cape: Richtersveld, plains W of Anenous Pass, ca. 68 km W of Steinkopf on the Port Nolloth road, 24 Sep. 1970, *Goldblatt 567* (holotype, BOL).

Plants 5–9(–14) cm high. *Corm* campanulate, 9–15 mm diam., 2–4 cm below ground, the tunics blackish, often glossy, basal margin with horizontally directed spines. *Foliage leaves* 3–4 (or more if plants branched), the lowermost usually conspicuously longer than the others, linear to narrowly lanceolate and ascending or falcate, 2–4 mm wide, strongly ribbed (corrugate), usually slightly longer than the stem, remaining leaves shorter and progressively more bractlike and the ribs weakly or not at all developed. *Stem* erect, simple or branched, the branching always near the base, somewhat compressed but not normally angled, without cormlets at the below ground nodes. *Inflorescences* spikes of (3–)5–9 flowers, usually fairly crowded; *outer bracts* green or flushed reddish below, firm, 12–20(–35) mm long, enclosing the slender part of the tube, green, the veins transparent, margins narrowly hyaline, channeled below, lightly keeled in the upper half, the keels minutely serrate or crisped, the inner bracts half to less than half as long as the outer, 2-veined and 2-keeled, with broad hyaline transparent margins. *Flowers* zygomorphic, white or sometimes flushed with pink to lilac (more so with

age and in dry material), the lower tepals yellow below and each with one or two median purple marks near the base of the limb and bearing a toothlike callus ca. 2 mm long at the base; *perianth tube* short, 9–12 (less in dried material) mm long, narrow below, curved and widening above; *tepals* unequal, lanceolate and acute, the dorsal largest, 18–23 × 6–8 mm, erect and held apart from the other tepals, the lower margins undulate or lightly crisped, upper lateral tepals united with the lower 3 for ca. 5 mm, the claws directed forward, the limbs reflexed, the lower 3 tepals horizontal below, and each with a median toothlike ridge, limbs 12–14 × 6–8 mm, flexed sharply downward at ca. 45°, the margins of the claws undulate. *Filaments* unilateral, 11–12 mm long, exserted 7–9 mm from the tube; *anthers* 4–6 mm long, white, the pollen white. *Ovary* oblong, ca. 3 mm long; *style* arching over the stamens, dividing opposite the base to middle of the anthers, the branches ca. 5 mm long, forked for ca. two-thirds their length, recurved. *Capsules* ovoid, 6–7 mm long, with auriculate lobes above the locules; *seeds* globose, ca. 1.4 mm diam., the surface regularly colliculate.

Flowering late August to mid October at higher elevations.

Lapeirousia spinosa is restricted to the Richtersveld in northern Namaqualand. It occurs on arid sandy flats in light, but fine-grained soil, sometimes in quartzite pebble patches. It is evidently most closely related to *L. divaricata*, a northwestern Cape species of seasonally wet sites such as seeps, stream banks, and drainage lines, always in coarse to medium-grained sandstone-derived soils. *Lapeirousia divaricata* has flowers nearly identical to those of *L. spinosa*, but the plants differ in vegetative appearance. Plants of *L. divaricata* are relatively slender, 12–25 cm tall, the spikes are held well above the leaves, and the branches, when present, are produced well above the ground level. *Lapeirousia spinosa*, however, has a compact habit, reaching 5–9(–14) cm in height, the spikes are borne among the leaves, and the branches are produced close to ground level. The difference in growth form combined with separate distributions and different habitat preferences make it desirable to raise *L. spinosa* to species rank.

The type and other populations of *Lapeirousia spinosa* from the Richtersveld have comparatively large flowers with the perianth tube 10–12 mm long and the dorsal tepal 20–23 mm long. Plants from a few sites to the south, however, have smaller flowers with the perianth tube 9–10 mm long and the dorsal tepal seldom more than 18 mm long. The smaller size suggests that the southern populations may constitute a separate genotype. Additional study of these smaller-flowered plants is needed to better understand the variation in *L. spinosa*. In the specimens cited below, the smaller-flowered collections are marked with an asterisk (*).

Additional specimens examined. SOUTH AFRICA. **Cape:** 2816 (Oranjemund) stony gravel flats near Arrisdrif (DA), 31 Aug. 1925, *Marloth 12389B* (PRE). 2817 (Vioolsdrif) ca. 5 km E of Eksteenfontein, quartzite plain (CD), 1 Sep. 1986, *Williamson 3610* (MO, NBG); near Doorn River, Namaqualand, 10 Sep. 1929, *Herre s.n.* (PRE). 2916 (Port Nolloth) between Port Nolloth and Holgat, Sep. 1929 (BB), *M. Schlechter s.n.* (PRE). 2917 (Springbok) Eksteenfontein road, 3–4 km N of the Port Nolloth road (AB), 8 Sep. 1980, *Goldblatt 5730* (K, LE, MO, NBG, PRE, S); Anenous plains, clay flats 2–6 km along old railway bed W of Grasvlakte farmhouse, 15 Sep. 1992, *Goldblatt & Manning 9456* (K, MO, NBG, PRE, WAG); 8 km W-NW of Vaalheuvel, Stryd River valley (AD), 24 Aug. 1957, *Acocks 19428* (BOL, PRE); stony river valley near Harras House, 24 Aug. 1980, *van Berkel 237* (MO, NBG). 2917 (Springbok) Rooibaken, flats SW of Komaggas (CD), 5 Sep. 1983, **Oliver 8034* (PRE); Komaggas, 9 Sep. 1950, **Barker 6675* (NBG). 3017 (Hondeklipbaai) 4 km from Wallekraal on road to Kamieskroon, 28 Sep. 1976 (BC), **Goldblatt 4246* (MO, NBG, PRE); Wallekraal, 30 Aug. 1935, **Compton 5420* (BOL, NBG). Without precise locality: Namaqualand Minor, Sep. 1883, *H. Bolus 6577* (BOL).
(* denotes smaller-flowered plants.)

4. Lapeirousia tenuis (Goldblatt) Goldblatt & Manning, comb. et stat. nov. Basionym: *Lapeirousia divaricata* var. *tenuis* Goldblatt, Contr. Bolus Herb. 4: 66. 1972. TYPE: South Africa. Cape: between Port Nolloth and the mountains of the interior, Sep. 1883, *H. Bolus 6575* (holotype, BOL; isotypes, K, SAM).

Plants 6–16 cm high. *Corm* campanulate-triangular, 12–15 mm diam. at the base, 1–3 cm below ground, the tunics blackish, the basal margins with fine laterally extended teeth 2–3 mm long, the tunics often accumulating, the margins thus somewhat brushlike. *Foliage leaves* 3–4, only the lowermost well developed, straight and linear or falcate, usually slightly longer than the stem or slightly shorter, 2–3 mm wide, ribbed (corrugate), remaining leaves less than half as long and progressively more bractlike above. *Stem* erect, simple or branched, lightly compressed. *Inflorescences* spikes of 9–16 flowers, the lateral branches with fewer flowers, distichous, becoming spiral; *outer bracts* green or flushed with red pigment, transparent on the veins, acute, 7–11 mm long, the apices curving upward, the inner bracts half to one-third as long as the outer, 2-keeled, the apices forked. *Flowers* zygomorphic, lilac to light purple, the lower tepals each with a filiform cusp

near the base; *perianth tube* 12–15 mm long, slender, curving outward in the upper third; *tepals* subequal, narrowly lanceolate to nearly linear, 9–11 × 1.8–3 mm, the dorsal erect, the upper laterals reflexed, the lower 3 joined to one another for ca. 1.5 mm, evidently extending horizontally. *Filaments* unilateral, ± erect, 5–6 mm long, exserted ca. 2 mm from the tube; *anthers* ca. 3 mm long. *Ovary* ovoid, ca. 3 mm long; *style* arching over the stamens, dividing at mid anther level, the branches ca. 2 mm long, deeply divided. *Capsules* globose-trigonous, ca. 4–5 mm long; *seeds* globose, 1.6–2 mm diam., brown, glossy, regularly colliculate.

Flowering mainly in July, occasionally into mid or late August, and once recorded in flower in early September.

Poorly known and evidently rare, *Lapeirousia tenuis* appears to be restricted to coastal central Namaqualand. Three of the five known collections are from the sandy coastal plain north and east of Kleinzee, suggesting a very local distribution. The remaining two collections lack precise locality data. The earliest collection of the species was made by Harry Bolus on his expedition to Namaqualand in 1883, in the hills east of Port Nolloth (some distance north of Kleinzee). The Namaqualand coast between Port Nolloth and Hondeklipbaai, which lies to the south of Kleinzee, is not well collected, and the distribution of *L. tenuis* may be wider than the present record suggests.

Although when first described *Lapeirousia tenuis* was regarded as a subspecies of *L. divaricata* (Goldblatt, 1972), additional collections of the latter, and of the related *L. spinosa*, also regarded by Goldblatt as a subspecies of *L. divaricata*, make it clear that *L. tenuis* is not closely related to either of these two species. They have in common serrated basal corm tunic margins and comparatively small bracts, but the flowers differ markedly. In both *L. divaricata* and *L. spinosa* the lower tepals are united with the upper laterals for 4–5 mm, and the lower tepals have large ridged calluses. This is not the case in *L. tenuis*, the narrow lower tepals of which spread more or less uniformly from the apex of the perianth tube. The lower tepals are joined for ca. 1.5 mm, but are not fused to the upper tepals at all, and they have inconspicuous cusplike teeth at the bases. It seems probable that *L. tenuis* is most closely related to *L. dolomitica*, at least on the basis of their similar triangular-campanulate corms and the rather fine basal teeth that project from the basal margins of the corm tunics. The two differ notably in the length of the perianth tube and the size of the bracts. In *L. dolomitica* the tube is at least 25 mm long and often 30–50 mm long, and the bracts are 12–20 mm long, whereas in *L. tenuis* the tube is only 10–15 mm long, and the bracts seldom exceed 11 mm and are often considerably shorter.

Additional specimens examined. SOUTH AFRICA. **Cape:** 2917 (Springbok) road from Port Nolloth to Spektakel, 16 km from turnoff, hills covered with quartz pebbles, 24 Sep. 1970 (fr) (AD), *Goldblatt 586* (BOL); 8 km N of Grootmis (Grootmist), 20 Aug. 1952 (CA), *Hall 579* (NBG); 1 km E of the Langhoogte Mine turnoff on Springbok–Kleinzee road, 145 m, 17 Aug. 1980, *van Berkel 196* (MO); sandveld between Grootmist and Springbok, 28 July 1937 (CA–CB), *Verdoorn & Dyer 1882* (PRE). Without Precise Locality: ca. 6 km N of Uguabis (not Uhabis, located NE of Vioolsdrif in Namibia), 6 Sep. 1925, *Marloth 12665* (PRE).

5. Lapeirousia macrospatha Baker, Fl. Cap. 6: 94. 1896.

Material of *Lapeirousia barklyi* and *L. macrospatha* available prior to 1972 included only a limited number of rather poorly preserved herbarium specimens. These suggested that there was a continuous range of bract and perianth tube size and that the types of the two species represented the extremes in the range of variation of a single species (Goldblatt, 1972). *Lapeirousia macrospatha* was thus reduced to synonymy in *L. barklyi* by Goldblatt.

Examination of specimens collected since then and a study of living plants make it clear beyond any possible doubt that *L. macrospatha* and *L. barklyi* are distinct from one another. *Lapeirousia barklyi* typically has a perianth tube of intermediate length, 20–25 mm long, and lilac to purple flowers with reddish markings. The bracts are correspondingly short, (10–)20–25 mm long, and comparatively narrow and acute. By contrast, plants that we attribute to *L. macrospatha* have a perianth tube 30–35 mm long, and a cream perianth, reddish on the reverse and with reddish markings on the lower tepals. The bracts are longer and wider than those of *L. barklyi*, 20–35 mm long, and less acute. In addition, the orientation of the tepals in the two species differs. In *L. barklyi* the upper part of the perianth tube forms a wider throat and the lower 3 tepals have distinct claws that extend upwards to form a cup enclosing the stamens, whereas in *L. macrospatha* the tube is nearly cylindric to the apex and the tepals spread outward from the bases.

Perianth tube morphology and tepal orientation suggest that *Lapeirousia barklyi* is most closely related to *L. fabricii*, a widespread Namaqualand and the northwestern Cape species. *Lapeirousia macrospatha*, however, seems most closely related to *L. arenicola*, which has flowers of similar form

and coloring, although they are substantially smaller in size. Both *L. barklyi* and *L. macrospatha* occur in deep sandy soils, the latter restricted to the Richtersveld, while *L. barklyi* extends from the southern Richtersveld northward into southwestern Namibia. There seems little difference in their habitats, although we have not seen them growing together. Both normally grow in large populations, and in some years appear to be a dominant species in a community of small annuals and scattered low shrubs.

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